

November 24, 1993

To: Wayne Hedberg, Permit Supervisor

From: Holland Shepherd, Senior Reclamation Specialist *HS*

Subject: HELP model and the Hecla, Escalante Mine Tailings Pond, M/021/004, Iron County, Utah

I've taken a little closer look at the information sent to us by Hecla concerning the HELP model. The model was used by the operator to predict potential leachate production into and out of the escalante tailings pond. The model was used to evaluate several different scenarios involving the type and depth of earthen materials to be used for a cap over the tailings.

The operator's HELP model evaluations indicate that the greater the depth of topsoil/subsoil material, the greater the reduction of leachate. Hecla's letter to DOGM, dated April 20, 1993, shows that topsoil/subsoil depths increasing from 12 to 18 to 24 inches, reduces the amount of water percolating into the tailings from the cap, from .1058 to .0355 to .0006 inches per year. There is not way to ever completely stop moisture percolation, but it can be greatly reduced.

Apparently, Hecla's argument is that what we approved last time, the 6 inch clay barrier, 14 inches of subsoil and 6 inches of topsoil, is equivalent to 12 inches of waste rock, 6 inches of subsoil, and 6 inches of topsoil. Their newest proposal of 6 inches of waste rock, 12 inches of subsoil, and 6 inches of topsoil, is supposed to be even better than what is need or what was approved before, based on the amount of moisture reaching the tailings.

? → Hecla argues 14" = max. rooting depth

Hecla also argues that the average rooting depth, for the plant community found in this area is 14 inches. Apparently, the BLM bought off on this argument earlier, but now is re-evaluating their position. I spoke to Paul Baker, our resident plant expert, at the Division. He indicated to me that the average rooting depth for many plants in this type of environs. is around 5 to 7 feet. Also, that many plants have secondary rooting systems that go much deeper into the soil. Most of the primary roots are of course found within the first foot of the soil profile, however the deeper penetrating roots are required for survival during droughty periods of the year.

I think the rooting medium needs to be a minimum of 2 feet. My reasoning is based on two important functions of the cap: 1. to prevent moisture from accessing the tailing and producing leachate; and 2. to provide an adequate growth medium for plants for cap stability, enhanced evapotranspiration, wild life habitat, and aesthetics.

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Water Qualities letter, dated July 14, 1993, summed it up when they said "A thicker subsoil and topsoil layer will intercept more precipitation and provide rooting depth to maintain plant growth. Vegetation is needed to prevent erosion and promote evapotranspiration."

I think that 2 feet of rooting medium will be just barely enough for plants, in this area. The climate is quite dry during the growing season, which stresses plants which lack a deep rooting system. The plants are necessary to keep the cap in place and will also act to wick water out of the cap in the form of transpiration. During the non-growing season a deeper soil profile will be necessary to contain water normally wicked away by plants.

Right now I have a little bit of a problem with the HELP model itself, because I do not understand the underlying assumptions built into the model. I need more information on it before we sign off on proposal made by operators based on the HELP model. I am currently tracking down a copy of the HELP model, for our use. Also, a copy of any guidance manual which may be available. Apparently, the Division of Solid and Hazardous Wastes has copies as does the Division of Water Quality. John Whitehead has been using the HELP model and has some literature that discusses it.

I am running this memo and associated information by Travis to get his input as well.